## ABSTRACT OF THE DISCLOSURE

## "BIOREACTOR APPARATUS AND CELL CULTURING SYSTEM"

A bioreactor apparatus and cell culturing system is provided for the automated cultivation and processing of living cells remotely both on earth and in low gravity which utilizes a generally cylindrical reactor vessel that may be optionally rotated about its cylindrical axis while allowing the entrance of fresh or recycled fluid and the removal, optionally, of spent medium, medium to be recycled or filtered or unfiltered medium for the collection of samples. The bioreactor vessel includes a cylindrical wall, two cover plates, two rotary unions, fill ports, and a polymeric filter. A method of exchanging gases between the culture medium and ambient gases is fabricated from a user-selected length of permeable tubing and a peristaltic pump. A polymeric fresh-medium storage bag and peristaltic pump is used for batch feeding, perfusion or sample collection. An enclosure and manifold representing an additional level of chemical containment and a series of pinch valves for the periodic collection of samples of suspended cells or cell-free medium is disposed therein together with a humidity control system consisting of a polymeric porous matrix and a fan. A computer program with graphical user interface for automatically and/or robotically controlling all functions especially including rotation of the reactor vessel, feeding fresh medium, perfusing the reactor vessel, timed collection of samples of fluid from the reactor, selecting between collecting cells or cell-free supernatant. A sealed compartment for sample-collection bags provides a level of chemical containment for safety. A sealed external housing is used for all components of the device except the power supply and computer. An external loop and electronic video microscope provides real-time and recorded and/or transmitted observation of cells in the suspension. All polymeric components are made of low-flammability, non-toxic, heat-resistant polymers such as polycarbonate, polysulfone, polypropylene, polytetrafluoroethylene, or silicone.